

Notice of Allowance dated 11-19-2003

Appl. No. 09/756,825

Amdt. dated 12-12-03

Attorney Docket No. 2204-002205

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph beginning at page 2, line 24, with the following rewritten paragraph:

-- According to the present invention, a controlling member is fixed to a mold in ~~such the manner such a manner~~ that it extends toward a cavity of the mold. A pipe (an insert member) is held in the cavity by insertion of the controlling member into at least one opening of the pipe or by inserting at least one end of the pipe into a hole of the controlling member. Thereafter, a molten aluminum alloy is poured into the cavity so as to enclose the pipe in a case body. --

Please replace the paragraph beginning at page 2, line 30, with the following rewritten paragraph:

-- The controlling member is preferably ~~one, which one which~~ adjustably extends through a wall of the mold into the cavity. Such an adjustable controlling member facilitates positioning of the pipe and ejection of a cast product. When a pin is used as the controlling member, the pipe is held at a predetermined position by inserting a tip of the pin into an opening of the pipe. The pin may be stepped at a middle part toward its tip, or an inner surface of the pipe may be chamfered at the opening, in order to inhibit inflow of a molten alloy into the pipe. --

Please replace the paragraph beginning at page 3, line 8, with the following rewritten paragraph:

-- The stepped pin can have a shaft of a diameter larger than an inner diameter of the pipe, so its heat capacity is big enough to rapidly solidify a molten alloy in contact with the stepped part. Consequently, the pipe is protected from inflow of the molten alloy. Such ~~the step step~~ is favorably formed with a right angle at a middle part of the pin, so as to enable insertion of the pin in face-to-face contact with a surface of the pipe. --

Please replace the paragraph beginning at page 3, line 14, with the following rewritten paragraph:

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-- The chamfered inner surface of the pipe at the opening ~~arises~~ creates a surface tension effective for suppressing inflow of a molten alloy into the pipe. Inflow of a molten alloy is also inhibited by coating the pin with a single or complex layer of such elements or compounds as Ti, TiN, TiC, CrN and BN, which are poor of wettability to a molten aluminum alloy, or by chemical conversion of a surface of the pin to a nitrided state or the like. --

Please replace the paragraph beginning at page 4, line 15, with the following rewritten paragraph:

-- One open end of the pipe fixed to the mold may be shut with a plug, so as to expand a gas in the pipe with a heat during ~~pouring~~ a pouring of a molten aluminum alloy. Such thermal expansion of the gas keeps the interior of the pipe at a positive pressure effective for inhibiting inflow of the molten alloy. --

Please replace the paragraph beginning at page 5, line 11, with the following rewritten paragraph:

-- Fig. 7A is a view illustrating an initial state of a core ~~cylinder in prior~~ cylinder prior to pouring of a molten aluminum alloy into a cavity of a mold. --

Please replace the paragraph beginning at page 5, line 20, with the following rewritten paragraph:

-- Fig. 9 is a graph illustrating an effect of a controlling pin on position of a center of a pipe in a cast product without deviation deviation.

Please replace the paragraph beginning at page 5, line 22, with the following rewritten paragraph:

-- Fig. 10 is a graph illustrating deviation of a center of a pipe in a cast body without use of a controlling pin pin.

Please replace the paragraph beginning at page 5, line 29, with the following rewritten paragraph:

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-- A cast product for use as a brake caliper has a cast body C enclosing a pipe P therein, as shown in Fig. 1. The pipe P has one end p₁ opened on a surface of the cast body C and the other end p₂ projected from the cast body C. The cast body C is drilled to a position facing to the facing the pipe P so as to form a hole H for a hydraulic circuit, and a hole B for attachment of a bleed screw is further formed. --

Please replace the paragraph beginning at page 7, line 5, with the following rewritten paragraph:

-- The controlling pin having a tip inserted into an opening of the pipe P may be a controlling pin 10 which is stepped 11 at its middle part and/or tapered 12 at its tip, as shown in Fig. 3. ~~Such the controlling~~ Such controlling pin 10 is adjustably provided in the mold 1 in the manner such that it extends through an insertion hole 7 of the mold 1 to the cavity 6. An opening h of the pipe P for insertion of the controlling pin 10 may be either an end opening p₁ (shown in Fig. 4a) or an opening (shown in Fig. 4b) formed at a middle part of the pipe P. --

Please replace the paragraph beginning at page 8, line 9, with the following rewritten paragraph:

-- A pipe P can be held at a predetermined position by inserting its end part to a controlling block 20. ~~Such the controlling~~ Such controlling block 20 may be one having a cave 21 into which an end p₁ of the pipe P is inserted (shown in Fig. 6a) or another having a cave 21 into which a squeezed end of the pipe P is inserted (shown in Fig. 6b). In any case, the same bracket 15 as shown in Fig. 4c may be coupled with the pipe P and inserted into the cave 21 of the controlling block 20, to secure the pipe P at a predetermined position. Inflow of a molten metal can be inhibited by surface treatment of the controlling block 20 in the same way. --

Please replace the paragraph beginning at page 8, line 26, with the following rewritten paragraph:

-- When the core 3 is carried forward and set in the lower mold member 2 by the drive of the core cylinder 31, the controlling pin 10 or the controlling block 20 is

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inserted into the insertion hole 7. Thereafter, a pipe P is located in a cavity of the mold 1 ~~in the manner such in such a manner~~ that a tip of the controlling pin 10 is inserted into a hole h of the pipe P or that one end p₁ of the pipe P is inserted into the controlling block 20, as shown in Fig. 7b. A middle part of the pipe P is put in an insertion groove 4 (Fig. 2) of the core 3. The other end p₂ of the pipe P is fixed by locating the other end p₂ in a positioning groove 8 of the lower mold member 2 (Fig. 2) or by inserting the other end p₂ in a hole of the core 3. --

Please replace the paragraph beginning at page 9, line 5, with the following rewritten paragraph:

-- After the pipe P is coupled with the controlling pin 10 or the controlling block 20 in the cavity 6, the mold 1 ~~are clamped~~ is clamped. A molten aluminum alloy is poured through a gate 5 into the cavity 6 under ~~such the condition, to such condition~~ to enclose the pipe P with the aluminum alloy. At this time, a force is applied to the pipe P due to kinetic and thermal energies of the poured molten aluminum alloy. However, one end p₁ of the pipe P is allowed for axial motion but prevented from dislocation along a radial direction due to coupling with the controlling pin 10 or the controlling block 20. The pipe P is restrained at the other end p₂ between the lower mold member 2 and the upper mold member or the core 3, and at the middle part by the insertion groove 4 of the core 3. Consequently, the applied force is absorbed as axial dislocation of the pipe P without radial dislocation at the end p₂, where formation of a hole H for a hydraulic circuit is estimated. Of course, the pipe P tends to elongate along a rightward direction in Fig. 2 due to its thermal expansion caused by a heat of the poured molten aluminum alloy. However, such elongation of the pipe P is suppressed by the controlling pin 10 or the controlling block 20, so that the end p₁ of the pipe P enclosed in the cast product is opened on a surface of a cast product at a predetermined position. --

Please replace the paragraph beginning at page 9, line 29, with the following rewritten paragraph:

-- Fig. 7 shows the state that one end p₁ of the pipe P is plugged with the controlling pin 10 or the controlling block 20. However, when a controlling pin 10 or a controlling block 20 is attached to an opening h of the pipe P formed at its middle part, both

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ends p_1 and p_2 of the pipe P ~~is opened~~ are opened as such. In such a case, plugs may be attached to both of the opened ends p_1 and p_2 of the pipe P, so as to maintain an interior of the pipe P at a positive pressure during pouring a molten aluminum alloy. Such a positive pressure is also kept by applying a gas pressure to the pipe P from the outside gas source. --

Please replace the paragraph beginning at page 10, line 24, with the following rewritten paragraph:

-- Location of the end p_1 of the pipe P at the inner part is advantageous for formation of a working hole B for a bleed screw without necessity of squeezing the end p_1 of the pipe P ~~regardless its~~ regardless of its diameter. ~~Such the location~~ Such location also enables formation of a working hole B for a bleed screw by the controlling pin 10 without machining the pipe P which is generally soft and poor of machinability. The controlling pin 10 made of tool steel or the like can be shaped to a small size due to its good melting resistance, so as to make the working hole B for a bleed screw smaller in size. If one end p_1 of the pipe P at a side of a bleed screw ~~exposes~~ is exposed on a surface of the cast body C, the pipe P can not be generally made smaller in size ~~accounting~~ due to melting during pouring a molten aluminum alloy. In such a case, a pipe P shall be preparatively squeezed at its end before arrangement in the mold 1, in order to make a hole H for a hydraulic circuit smaller in size. --

Please replace the paragraph beginning at page 11, line 18, with the following rewritten paragraph:

-- After arrangement of the pipe P, an upper mold member was put on the lower mold member 2, and these mold members were clamped together to build up a mold 1. A molten aluminum alloy (JIS A4CAC) held at 700°C was poured into the cavity 6. ~~20 pieces~~ Twenty pieces of brake calipers enclosing the pipes P therein were manufactured in this way. --